CDC Ebola Response Oral History Project

The Reminiscences of

John F. Vertefeuille

David J. Sencer CDC Museum

Centers for Disease Control and Prevention

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John F. Vertefeuille

Interviewed by Samuel Robson
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Interview 1 of 1

CDC Ebola Response Oral History Project

Q: This is Sam Robson, here with Dr. John Vertefeuille. Today's date is June 22nd, 2017, and we are in the audio recording studio here at CDC's Roybal Campus in Atlanta, Georgia. I'm interviewing Dr. Vertefeuille as part of our CDC Ebola Response Oral History Project. Thank you so much for being here.

Vertefeuille: My pleasure.

Q: For the record, would you mind just stating for me your full legal name and your current employment status?

Vertefeuille: Sure, my name is John Francis Vertefeuille. I am the CDC Polio Eradication Branch chief currently.

Q: Perfect. If you were to give someone a capsule description of what you did as part of the Ebola response, just a few sentences, what would you say?

Vertefeuille: I think what I'd say—capsule description. For the Nigeria Ebola response, I was the team lead during a period when a lot of the cases occurred, and was responsible

for helping the Nigerian government organize the response and how they were going to implement it. Later, during the end of the first phase of the Liberia Ebola response in February of 2015, I also served as the epi [epidemiology] lead and deputy team lead for that response for CDC. Really, helping sort out those last transmission clusters and how to close them down.

Q: Perfect, thanks so much. I often ask that question and then somebody talks for like five minutes and then it's like, ah, I asked for a capsule—sorry. Anyway, perfect. So, can you tell me when and where you were born?

Vertefeuille: Born in Putnam, Connecticut, in 1973, February 3rd.

Q: But grew up in—

Vertefeuille: I grew up in Brooklyn, Connecticut, so that was just the hospital was in Putnam. Small town, near a lot of places, but pretty small.

Q: What's—I don't know the geography.

Vertefeuille: It's about six miles from Rhode Island and about eight miles from Massachusetts, just tucked up in the northeast corner of Connecticut, on rural farm land.

Q: What kind of kid were you?

Vertefeuille: [laughs] Demanding. I think that if you asked my parents they might use more of a vernacular for that. [laughter] But no, I think I tended to be very focused on what I thought needed to be done, and then would figure out ways to try and move towards those goals. I'm pretty goal oriented for my whole life, as far as I can remember.

Q: What were your early goals?

Vertefeuille: Early goals, like what are we talking about in terms of early?

Q: Like when you were growing up, up through high school. You're goal-oriented—

Vertefeuille: I was very focused on having fun, academics. My buddies and I used to mountain bike every day after school, and so that was a big focus. We lived pretty far from our high school, so we would drive in every day, like sixteen miles, but we'd throw the bikes in the back of the truck and after school just head out to the state park and do that. Whether it was ski club or other things. And focused on getting good grades and figuring out what I wanted to do with my life, which I still think sometimes I'm figuring out exactly what I want to do with my life. [laughter]

Q: Was it immediately, I'm just going to eradicate polio, at that age? [laughs]

Vertefeuille: Oh, not at all, no. In fact, for some period of time I thought I would be—my mom was a nurse and my dad was a builder, so I assumed that I was going to go to school and do biomedical engineering, and was looking at that as early options. In college, that turned into maybe going to medical school. In between college and what ended up being graduate school, I decided to do a master's degree in molecular microbiology and immunology, and when I did that, I happened to do it at the Johns Hopkins School of Public Health, and had to take some required epidemiology courses. As soon as I took them, I knew I liked that. I took all of them and shifted focus to doing epidemiology. Ended up taking a job at the state health department. This great lady, Liza Solomon was her name, who was running the HIV [human immunodeficiency virus] unit at the health department in Maryland at that time. She said, "If you want to get a PhD in epi while you work here, we would be very supportive of you having a flexible schedule to do that." And so jumped into the PhD program and just went on that path.

Q: What were some things that you were initially involved in, in that work with the state health department in Maryland?

Vertefeuille: Even before that, I think when I was getting involved in the epidemiology, I was working on the needle exchange program in Baltimore City, which was really a formative part of what I liked about doing the public health work. At the time, the federal government didn't provide resources for needle exchange, but could provide resources to evaluate needle exchange where you get—I don't know how much people know about needle exchange, but basically, you're dealing with heroin users and they bring in dirty

needles to the exchange and they get clean needles as a harm reduction mechanism to reduce the spread of HIV and other transmissible diseases in the population. We would drive around in this RV [recreational vehicle], following the needle exchange van to its various sites in the city, and we would invite the needle exchangers to do interviews with us and HIV testing and counselling to understand both their status, but also what the risks were and how the exchange was impacting their risks. It was just a very—I don't know how much you know about Baltimore, but inner city Baltimore, at that time—and this was in the nineties—had seen an exodus of people from the inner city. What remained was these long-time Baltimore residents, who were just very colorful and enjoyable in terms of how they approached description and discussion of things and their reflections. Every day was a new day with a new story coming out of there, and people with real hard problems, but who still found enjoyment in different parts of their life and would find these real descriptive ways to talk about their experiences. It was always very rewarding to engage with them.

Q: Are there any particular stories that stay with you, even now?

Vertefeuille: Let me think. There was this real funny story that came up at a time when I was learning the basics of epidemiology. We were out in the van, and I remember I was in the back because it was a quiet day, studying, studying my basic epidemiology methods. It was an RV, so we were in this metal can, and there was this rap at the door, rap-rap-rap-rap, like a knock, a very firm knock. The study coordinator, who was out there with me, went up, and he looked at me like he knew what was coming wasn't going

to be an interview. He opened the door and he said, "What can we do for you?" And the guy said, "Hey, how do I get in the study?" And he says, "Listen, you can't get in the study. You can't choose to be in this study up front, you're randomly selected and then you have a choice about whether to participate. You've got to be randomly selected, we just can't let you come in off the street." The guy says, "Oh, okay," and he walks away. About three minutes passes, and the same raspy knock on the door, rap-rap-rap-rap-rap, and you know it's the same guy. The study coordinator opens the door again, and he says, "What can I do for you?" The guy looks at him and he says, "How can I get myself randomly selected?" [laughter] It was great because it's a term that we use all the time in epidemiology to talk about how we create a generalizable study, but to this guy, he just wanted to know, how do I get in? Thinking about it, the study coordinator said, "It's like winning the daily number. You can't get yourself selected, it just has to happen." That was an enjoyable moment that I still remember to this day.

Q: It's good that he was able to pull that, "Well, it's kind of like the lottery actually." Yeah, that's good. Did any of that needle exchange stuff become a focus for your PhD?

Vertefeuille: That parlayed into getting a job at the health department in the HIV—it was called the AIDS [acquired immune deficiency syndrome] Administration, and dealt with the HIV-infected population in Maryland. With them, I had two competing projects, one of which would end up being my PhD dissertation. We weren't sure when we started which one it would be; a lot of it was based on the varying complexities of the two projects. One was an HIV and hepatitis B and C project in the Maryland prison system,

which we thought was going to be the dissertation project, but because of the complexities of doing that, working in the prisons, it ended up taking quite a long time to get the study approved and off the ground and done. Then the other was—at the time, there were such sensitivities about being infected with HIV that Maryland was not a name-reporting state. If you were an AIDS case, you were reported by name because you had all the medical services that you required, but if you were HIV-positive, you weren't. It was actually a code-based system—parts of the social security number, dates of birth, and your gender and your race by code. This was a time when HIV drugs were now available and people were living longer, so we realized that our numbers were becoming less accurate in terms of what the HIV population in the state actually was because people were not necessarily dying of AIDS; they could be dying of cancer, they could be dying of car accidents, or any other number of causes. What ended up being my dissertation was we actually devised a registry matching system where we could use the code that we used for HIV reporting and match it with the vital statistics death registry in the state and identify who amongst that, with great precision, who amongst the HIV positive population was still alive and who had actually passed away and what they actually had died of. We were able to define that and create a system by which they could track that over time and down-adjust their numbers as appropriate.

Q: That sounds incredibly useful.

Vertefeuille: It was helpful at the time. It's now no longer necessary because—

Q: It’s a little obsolete now?

Vertefeuille: Yeah, because of the change in the environment related to HIV.

Q: So what happens after that?

Vertefeuille: Wow, we’re covering a lot of long-time-ago stuff.

Q: Yeah, sorry, we can go—

Vertefeuille: No, no, that’s okay.

Q: When do you have to take off?

Vertefeuille: I have time, I left a half hour after the slotted time just in case, I wasn’t sure what to expect. So, what did happen after that? I still had that degree in molecular microbiology and immunology, and now a new PhD in epi, and that made me a good fit for a group that had started up a few years before at the University of Maryland. Bob [Robert C.] Gallo, who is the co-discoverer of HIV, had established an institute called the Institute of Human Virology at the University of Maryland a few years before that along with Bob [Robert R.] Redfield and Bill [William A.] Blattner and George [K.] Lewis and a couple of other folks, Joe [Joseph L.] Bryant and some others. That institute was rapidly growing at that time, and Bill Blattner ended up recruiting me to go and work in the

epidemiology group there. It ended up being a very nice fit because the group—in entirety, the group was very basic science focused, but the epi group was looking at international health issues and the link between epi and lab [laboratory] science, and so the combination of those two degrees fit well. I ended up taking a faculty position there, and part of my salary was funded by this small grant, pre-PEPFAR [US President's Emergency Plan for AIDS Relief], this was—I'm forgetting what the name of the funding group was. Anyway, it was a group that focused on HIV prevention activities, and this was pre-PEPFAR, so there weren't big treatment programs available. This grant was in Nigeria, and part of my salary was funded to work with the Nigerian military to develop an HIV prevention program for them. I would travel there frequently, or six weeks at a time, and come back to the US, and then go back out a few weeks later, working in rural Nigeria on this prevention program. That program then became one of these early PEPFAR programs. This was right in the early 2000s, when PEPFAR was ramping up, and we were able to parlay it into one of the CDC's University Technical Assistance Programs, the UTAP program, pre-PEPFAR, which was a training program, but then became a major instrument by which CDC administered PEPFAR programs early in PEPFAR. That program was rapidly growing in Nigeria, and at a certain point in 2004, CDC—because PEPFAR looked like it was going to be big in Nigeria, with it being one of the fifteen original focus countries, CDC was looking to expand its office there, and they recruited me from the University of Maryland to run that office. I took that position in early 2005 and moved out to Nigeria and ran the office there for three years. It was a real exciting time of growth and innovation in HIV, in the international HIV world, and we were able to work closely with the government to establish a lot of systems, which

later, actually, I've been meaning to write this—well, I'm sorry, I'm in an interview. I've been meaning to write this paper for some time, but actually looking at how these investments that CDC makes in health systems can pay dividends in the long run.

While we were out in Nigeria developing this big HIV program, the office went from—when I got there, we had eight people including me, and the budget had just gone from three or four million to thirty million dollars in a year. When I left three years later, on the books we had eighty-four positions, I think we had filled sixty-three or sixty-five of them, and our budget was two hundred twenty million dollars a year. You can imagine, with that kind of investment, you're focused on a disease, but you're also building a system. Some of the key elements that we invested in were a Field Epidemiology Training Program, which was quickly exercised with the H5N1 bird flu, avian flu [influenza] outbreak that occurred there in poultry. And we actually documented, I think still, the only documented case of H5N1 in Sub-Saharan Africa out of the lab we had developed with the government there as part of that response with the field epi program. It didn't even exist at the time, but we were in the development phase with it and were able to pull in some regional support from Rob [Robert F.] Breiman's group in Kenya and also some EIS [Epidemic Intelligence Service] officers and do that response. But we invested in and developed that program, and then through that response and then later investments in the lab systems, we were able to establish an advanced lab capacity with the government. Of course, ten years later in the Ebola response, these things all paid dividends because they had a huge pool of trained field epidemiologists that came out of a decade's worth of that programming. They had the ability to do molecular diagnostics,

and equipment and supplies in the country to do that. Of course, they had a very big surveillance capacity and emergency response capacity with the polio work. In the end, through these different strings of investments that we had made in people knowing how to do outbreak response in public health, lab systems to support that work, and emergency response capacities, we were able to effectively mount this Ebola response in a way that, at the time, was quite different than the experience being seen in other parts of West Africa in the Ebola response.

Q: I want to take us back for just a second. Was it around 2004 you visited Nigeria for—

Vertefeuille: The first time? I think it would have been 2003, 2002 or 2003 that I visited for the first time. By 2003, I was going there quite extensively, 2004 that continued, early April 2005 I started with CDC and still was TDYing [going on temporary duty assignment] while they got my paperwork and my medical clearances and my security clearances in place. But then moved there in October of 2005, and was there permanently for three years, until July of 2008.

Q: What were your initial impressions of the country?

Vertefeuille: Of Nigeria?

Q: Yeah.

Vertefeuille: Nigeria is a place where people tend to have very strong opinions, either towards the positive or not so positive. My wife and I, my now wife, she wasn't my wife at the time, but we lived there together, and prior to that we had been working there together. She and I loved the place. It's a place where the people really have a lot of things in the system that work against them, but they don't let it keep them down. They're real optimistic. There's a lot of ingenuity, there's a lot of motivation, and also a lot of humor, and it's a very in-your-face kind of place where people will be laughing and talking and you can tell that they just like to have a good time while they're going through all of the sometimes difficult things that they have to go through. We love that, and we still have a lot of friends today in Nigeria many, many years later. My first impressions were that, this real positive experience, combined with a real sense of the enormous complexities of moving the agenda of not just health, but of development forward there. If you can imagine—I've done this comparison many times previously, not on tape, but in private conversations—that when the US started to form and we went through the things we had to go through to organize ourselves, you're talking about a handful of millions of people, and I would imagine it was quite a struggle. In the case of Nigeria, you had, at the time—the population has grown since then, but at the time, you had about 120 million people and a very new country. Independence was '98 I think, '98 or'99, and we were just a few years into the new democratic government. And they had to fix all of these things, from corruption to lack of infrastructure to planning the education system to poor health indicators. How do you start to unpeel that with an impatient population that expects and wants more and deserves more? So a very complicated social environment and political environment that needed to adjust fast to

what was going on. But my wife and I have had so many great experiences in Nigeria that it will always be a second home to us. When I go there, I don't feel like I'm going someplace far away, I feel like I'm actually going someplace quite close to home.

Q: You lived there for a number of years. What was that experience like, adjusting to living in Nigeria?

Vertefeuille: Adjusting to living in Nigeria was not so difficult. It was a place I knew well by the time I moved there. My Nigerian colleagues and friends joke with me that I would always know the new restaurants on the block before they did. I knew that place well, and so that adjustment wasn't too substantial. You get used to the things you have and you don't have in the environment like that, and it's the little things. Like it was very difficult at that time there to get a to-go coffee. If you wanted to go for a coffee, you had to go and have a meeting or sit down and expect to have a coffee. You couldn't just walk into a Starbucks and get a to-go cup and go. You adjust to those things, lack of internet service or sporadic internet service and things like that.

The harder part was actually the major shift in the US government health presence in Nigeria and the expectations by this rapidly expanding HIV program that we were running. It was managing, both understanding how the US government operates overseas—I was new to the government and I was new to CDC, but also, how do you very quickly understand the baseline of what the health system has to offer, capitalize on those best parts of it, and then fill in where there are gaps? A lot of our early work was

building the platform, not just for what we needed to do that year, but what we were going to need to do five years from then. I have often used an example of the lab work and the development of the lab capacity. At the time, we had to get basic HIV diagnostics and other diagnostics for just the maintenance and care of the population into these hospitals, into many hospitals. I'd say to lab folks who would come visit, when you talk about building a capacity to do this testing in a lab, you're probably talking about buying some sort of equipment, buying the supplies that go with it, doing training, basic training on that with the technicians and with those who will read the results, and then training the physicians how to then read those results. But when we talk about building lab capacity, and to do that same test here, sometimes we're talking about having to clean the water, having to find the water, having to identify a source of electricity, having to understand whether the refrigerators are going to be on three hours a day or twenty-four hours a day. And if they need to be on twenty-four hours a day, building the capacity to do that. You're talking about putting in power, putting in water, putting in safety mechanisms so that the equipment doesn't get destroyed as soon as you put it in because of surges in the power and things like that. And then still doing all of those other things, getting the equipment, doing the trainings, bringing the people up to speed, helping them understand the results. It's a lot longer front-to-back process, which is actually—I mean, if I think back, going through that and having to develop those systems has actually served me in so many ways in my career. Not just in the technical work that we do, but when you think about it, I remember having—it's a directly analogous discussion where some senior folks from CDC's business services came out to visit us in Tanzania when I was running that office after I left Nigeria. We were talking about an HR [human resources] process,

and they were quoting numbers that just didn't match with the amount of time it took us to get people deployed to the field. It occurred to me that it was the same issue as this lab issue, that they were looking at the HR process from the time that an announcement was made to the time that a selection was made. And in the field, we were looking at that from the six or eight months in advance of that announcement being made that we would have to get State Department approvals, CDC approvals, develop the position descriptions, put them into the system, get approvals for them, and then open that announcement; to at the end of the process, the period of selection to start date. But then medical clearances, security clearances, international moves and arrival at post. In fact, the official times were not the real times, and so in some ways, it's directly analogous: our business systems have to match our work, and in many ways in these resource poor environments or in field deployments, a lot of what we have to do as managers is to figure out ways to look at the whole, start-to-finish process and not just the individual pieces that specific groups might have to define here or elsewhere that don't encompass that start to end.

Q: Right. Can I ask, how do you make the transition from focusing on HIV then to polio?

Vertefeuille: Sure. That's great. Definitely early in my career, there was a lot of HIV focus, but as I think back to those early PEPFAR days, because it was such a big program against the backdrop of a real challenging public health system in terms of the gaps that were there, we actually had to do a lot of system building and looking at the intersection of different diseases or systems with different diseases, including HIV. Intrinsically in

that work, there was a lot of cross-fertilization to other things. That most directly was TB. TB and HIV sort of affect the same populations and contract with each other, and that was a natural link. But also, this outbreak response capacity and this epidemiology capacity through the field epi program and lab capacities that were directly applicable to HIV. But that whole system approach also had a lot of basic training that cut across public health, with a focus on HIV. That helped me do a lot of cross training.

Then the bottom line is that for—and I think that many people at CDC who have spent time in country offices understand this in a very unique way. When you're out there and you're from this agency, there is an expectation that if things come up, that you're going to need to help the government organize itself around those responses. In my career, in all the countries I've worked in, we've had situations where we had to respond to other things. In Nigeria early on it was H5N1, avian flu, and we also had various other smaller outbreaks at the time. But the truth is, when I was running that office, which was focused on HIV, we also did have a GID [Global Immunization Division] person seconded to WHO [World Health Organization] doing polio work. This was in the days when it was pre-Center for Global Health. We had a coordinating office for global health, and they asked the country offices to engage increasingly with these folks just to understand what the lay of the land was, not to interfere with their day-to-day work, which was managed by WHO, but to have sort of a broader representation of what the agency was doing to be able to inform the State Department and keep headquarters informed about what was going on.

At the time, polio was going quite bad in Nigeria. In fact, I have in my archives this letter from Director-General Lee [Jong-wook] to President [Olusegun] Obasanjo that says, "It's with great regret that I have to write this letter to you"—I'm paraphrasing of course—"because Nigeria has exported wild poliovirus to thirteen other countries in the last"—this letter was probably in 2006 or '07. "Has exported polio to thirteen other countries and has caused the international community three hundred million dollars to respond." In fact, by the end of that, Nigeria exported polio to thirty countries. It's a classic example we use in polio. But because of that pressure, and because there was a huge amount of anti-polio sentiment at the time, and you'd see it in the papers, like descriptions of polio vaccine potentially causing sterility. This was of course not true, but it was a real sort of push that the northern part of the country did not want to engage in polio. Because of that, President [George W.] Bush was concerned about it and asked the agency to be very actively engaged, and there was a lot of activity around that. Elias Durry, who still works with us here in polio and who's worked in polio long before that, was the detail to WHO at the time, and so he and I used to go out and have dinner at the Hilton [Hotel] where he would stay when he was there all the time. I think I had fifty dinners with him, and every time he ordered spaghetti Bolognese. In fact, I joke with him still that when I go to Nigeria I'll bring him back a bag of spaghetti from the Hilton. [laughter] But he and I would talk about the polio issues and what needed to be done and how that response had to change.

Then, in our office, we had this really great physician from northern Nigeria, Nasir Sani-Gwarzo was his name, and he is somebody I still keep in touch with. We had hired him as

our senior local staff member in our office and he really was in charge of all of our programs, our technical programs in the office. He was from Kano, his family was very known in Kano, and he had a lot of connections up there to both the communities but also to the government, the government officials. He had this idea at the time that he should work full-time on polio. He was in charge of our HIV programs, but he said, "I'm from the North, I understand this issue, I think I could make a difference." He took it upon himself to write this concept note about a program that would help educate the population about polio in a positive way, and about what could be done to prevent it. He wanted to work on that. I remember very clearly we were having this discussion in my office, and he wanted to know if he could work on this full-time. I said, "I think we'll have to move several small mountains to make that happen, but let's try." So, started making some calls back to headquarters, and we actually came up with this model in the office that had not been done before in Nigeria—I don't know if it had ever been done in the CDC office other than Nigeria before. What we agreed with was that between the HIV group and GID and us in the office, that we would have GID provide salary support for his time for the next—it ended up I think being two years, but at the time it was for a year—and we would provide day-to-day and supervision of him in the office. So rather than having to send an American out to the office to work full-time on this in addition to the support they were providing to WHO, they could use a local staff member who had both the expertise and the entry points to northern Nigeria to help solve this problem. He went about developing this education program for religious groups called Majigi, it ended up being called Majigi, but it was basically these educational films and talks that would be given to religious groups and to communities in the North to educate them about polio,

and to then start to, amidst a whole bunch of other changes that were being made by the polio program, start to change the tide of what was happening there. I left, we set that up, and shortly after that—that was probably 2007, late 2007 or early 2008, and I left to go on to my onward post of Tanzania and then Haiti and didn't go back to Nigeria for five years.

When I ended up going back for the first time, I saw that the polio situation had changed quite a bit. Not just because of Majigi—it was an important part—but there was an overhaul in the program. They had had some progress and then had some setbacks, but then in 2011 with the declaration of polio as a global public health emergency, they had established an emergency operations center for polio in Nigeria and had streamlined the way that they were both giving inputs to the program, but the transparency, accountability, and the outputs of what was going to be provided. The program had done a lot of work with the northern governments, the state governments and local governments, to get engagement, but also with the religious establishment in the North to reengage and revitalize their relationship with their religious organizations, and had really turned the tide of polio in the city and the country. It was pretty remarkable to see that change in the five years that I had been gone. I was jumping back in as—this was after my tours in three countries overseas, running those offices in Nigeria, Tanzania and Haiti, coming back and being the Atlanta-based polio lead for Nigeria mostly, not because I was a polio person, but because I had engaged with GID at different times in the different countries and because I knew Nigeria quite well. But to go back and see that changed paradigm, and then jumping into that, was pretty fabulous. And to see how very different

the outcomes were based on those changed investments and the accountability associated with those investments.

Q: Can you describe a little bit about how that EOC worked in the next few years? From 2011 up through Ebola, how it developed, what were the mechanisms were?

Vertefeuille: Sure. I can't talk about 2011 and '12 because I was in Haiti at the time. But 2013, when I jumped back in, the EOC was established and functioning. Really, we think about an EOC literally as an emergency operations center, but as a place that really is a central point for the inputs and outputs of resources. What was very unique about the Nigeria EOC compared to the administration of some other health programs in the country was that it served as a point of coordination, organization, and dialogue for all the polio investing partners, for all the polio technical teams, and for the leadership of the Nigerian government to guide that program. If you can imagine, it was—the [Bill & Melinda] Gates Foundation had invested in the infrastructure for the EOC. It was actually a modified house in Abuja—it still is a house that has been modified to be an office. It's a very comfortable space, the lights work and the air conditioner works, but also the communications work and the internet works and there's appropriate conference rooms.

Those things are very good, but the nerve center and the functionality of that EOC was actually the convening space and the accountability for everyone in a transparent way that it provided. If you can imagine, the government led the EOC, and it brought together the partners. We met, at least in a general fashion, once a week if not more depending on

what was going on, and then we had different sub-committees that would meet even more regularly. I served on the strategy committee within that EOC, which was sort of the polio leads for the different agencies that were involved, and we would set the direction. But then, because everybody was there, the direction was being heard simultaneously by everyone and the resources were requested, and identified who was going to be responsible for providing resources for a particular part of the response. The timelines were defined and the identified task was linked to a responsible party and to a set of resources and a timeline. There was then no differential between my ability to understand who was responsible, what was supposed to be done, and when it was supposed to be done by, and the government's ability to know that and WHO's ability to know that and Rotary [International]'s and Gates Foundation's ability to know that as the core partners. You had at the national level, this ability to define what the priorities were together, to resource those priorities, and to then set an expectation for when they were going to be done. That then was transmitted to the field, the state and the local teams, whether it was the need to, in very difficult places, redo micro-plans to better understand the population, or to identify what additional things needed to be provided to gain their willingness to take polio vaccine. Different approaches to that, or whether it was issues with variable data quality coming in and corrective action needing to be taken, whether it was training, or whether it was additional staff or whatever it might be. That, being transmitted from that central point of organization to the field and then reported back in a real-time way. Very much about transparency and process, and one government-led plan supported by partners. That was really what was unique and remains unique about that approach. And of course, that served dividends later with the Ebola response.

Q: Of course. And I want to get into that. I'm going to reset my computer back here because—

[break]

Q: Were you, at this time when you go back into polio, were you based in Atlanta or based in Nigeria?

Vertefeuille: I was actually based in Atlanta when I took that position, but I was probably spending greater than seventy percent of my time in Nigeria. I would go on a three, three or four-week trip, come back for a couple of weeks, then go out again for a long period of time. We had a rent-by-day apartment that a few of us stayed in. It was typically Frank [J.] Mahoney, myself, Hashim el-Moussaad, and Eric Wiesen would come in and out at that time as well. Eric is now the team lead for that team. We had this group of very regular travelers that would go. It was actually not dissimilar to the situation when I had been the country director there. You had Elias Durry and Sue [Susan I.] Gerber and Steve [Steven G.F.] Wassilak, who would come through at that time and support the programs. The big difference was that the government itself had organized itself around this EOC approach that was bringing the partners together. We had also at CDC activated our Emergency Operations Center for polio, and therefore, our ability to identify more directly things that were needed and then to resource them and make sure they happened was there. It was a very active engagement on polio that included both that continued

support of the overall system, but the ability to innovate in places that things were challenging. That was a very enjoyable and unique part of coming back into it.

Q: So, Ebola starts raging. It's July 20th, I think, when the gentleman flies from Liberia to Lagos. At this time, you're spending about seventy percent of your time in Nigeria. Are you paying close attention to what's going on in these neighboring countries to the west as Ebola is spreading?

Vertefeuille: Yeah. I think you're going to like this. I'll tell you my recollection of the early events of the Ebola response in Nigeria, and probably a lot of people haven't heard this story, but some have. Frank and I, Frank Mahoney and I, were at the apartment watching the news sometime in mid-July, and we were talking about the Ebola outbreak in West Africa. At that time, CDC was only just thinking about activating the emergency response. It had been, to that point, a fairly WHO-focused response in those three countries, but it was hitting the international news and we were talking about it. I was actually on my way back to the United States, would have been right around—somewhere in the 20s in July. I was in the car going from the apartment to the airport, and I got a call from Tom [Thomas] Kenyon, who was the CGH [Center for Global Health] director at the time. Tom said, "Hey John. Dr. [Abdulsalami] Nasidi"—who was the head of the Nigeria CDC—"is supposed to come to Atlanta for a meeting next week, but he hasn't done his visit or paperwork. Can you give him a call?" He knew I knew him. He said, "Can you give him a call and see if you can get him to do that? Otherwise he's going to have a problem accessing the meetings when he gets here." I said, "Sure, I

can do that right now. I'm in the car, I have some time, let me do it." I got off the phone and I gave Nasidi a call. I said, "Hey, are you supposed to go to Atlanta next week?" He's like, "Yeah, yeah, yeah." I was like, "Can you do this paperwork? Because we're going to have problems getting you on campus if you don't." He says, "Oh, I'm so sorry, I've been very busy." I said, "What's going on?" He said, "I'm down in Lagos." I said, "What's happening in Lagos?" He said, "I think we have Ebola." I said, "What?" [laughs] He was like, "Yeah. I'm down here, I think we have Ebola." I said, "Okay, couple of things. First, don't worry about your paperwork." [laughter] "Second, let me make a couple of calls, and I'll call you back in a few minutes." I hung up with him, and at this point, I was at the airport and I had to get through security. I got through security and went to the lounge in the airport, and the lounge was full of people. I called Frank at the apartment, but I'm in this very crowded space and we don't really know what's happening. I was like, "Frank, do you remember that issue, that public health issue in the region we were talking about the other day?" Frank is not one for beating around the bushes. He's on the other side of the line, he said, "What do you mean? Like Ebola?" I said, "Yeah, that's it. It might be here. Could you call Dr. Nasidi and probably go to Lagos tomorrow? Because he's down there and they're concerned about it, whether or not they have it. I'm at the airport, I'm going to go back to the US and see what's happening in Atlanta related to this, and probably will turn around and come back as needed."

We did that, and Frank called Dr. Nasidi, went down—I don't know if it was the next day, but went down shortly after that. Got down there and helped organize that early

response. Meanwhile, I got back here and was talking with Greg [Gregory L.] Armstrong, who was my supervisor and the polio incident manager at the time. We had just started to activate—like the week before, we had activated here in Atlanta, so there wasn't much infrastructure. Eventually, Ebola ended up having a huge infrastructure to successfully complete that response in the region. But at the time, it was just a handful of people. In talking with Greg and talking with Frank about what the needs were, and Frank was on the horn to everybody back here, Ray [R.] Arthur and others who were—and Inger [K.] Damon and others who were involved in the response. I think Inger was involved at that point, but definitely Stuart [T.] Nichol and some others. It became apparent that we were going to have to just—as people who were in-country, we were going to have to deploy and re-deploy. Quickly, we moved a couple other polio folks who were either in-country or about to be in-country to go down to Lagos and help understand what was going on, what was real, and to start to develop that response with the government.

Q: Who were some of those folks?

Vertefeuille: I'm trying to think who the early ones were. Frank was down there, and then Yolonda [V.] Freeman was early down there, and I believe Andrea Carcelen might have been a third person who was amongst that early deployment group because they were in-country. Then, of course, we had this big, CDC-funded NSTOP [National Stop Transmission of Polio] program that was doing the polio response, which was housed in the Field Epidemiology and Lab Training Program in Nigeria. Several of those

NSTOPers, along with the field epi program lead and others, went down to start filling in the response components for the Ebola response.

In the meantime, we were trying to generate resources here, and I ended up being in the US for—I can't remember how long it was, ten or twelve days, and then went back to Nigeria. At that point, they were housed in not a very comfortable, but an available space in a local public health lab administration building in Lagos. The response was active, and it was dealing with the early parts of those clusters—not just understanding, but all of the fear and all of the press reports and all of the sort of not-yet-glued-together pieces of the response. Getting back—I don't know if you want me to continue down this line.

Q: Please do. Yeah, no, I do.

Vertefeuille: Jumping back in now, down in Lagos. Actually, one of my favorite memories of this response was how much we could rely on the people we work with, both the national and the international staff that were so committed to this, and also to this very unique partnership that Frank and I had developed in our polio work. I think one of the early apparent things in getting back was one, that there needed to really be an overhaul of the organization of the response to be more effective. Two, that we could learn very rapidly from how polio emergency response was administered in Abuja. And then three, the immense feelings of uncertainty about what level of personal danger you might be in because it was relatively unknown and you didn't—at that time, all the infection control systems weren't in place yet, and you weren't quite sure what the person

next to you had been experiencing. We were all on a learning curve. But also, the intensity of how much the response and the response time mattered. It was pervasive, and you could see it in everyone that the expectation was that you were going to do three things: you were going to sleep when needed, you were going to work, and you were going to eat, and that was it. Everybody was in that same frame of mind, that this was so important and there was such an urgency about it and getting it right made so much difference that we had to do it and we were all in it together. So, a real sense of team and commitment.

In thinking through what the options were, we were aware early that using the same emergency response capacities that were used in polio was going to be necessary. The early meetings were just very—and typical to some of the other programs that you sometime see in countries, if you had to tell everybody something, you'd gather them all together and you'd tell them. You would have in this very small conference room—not super small, but a reasonable size conference room—but you would have 150 people gathered and it would be a three-hour meeting. The problem with that organization was that those 150 people needed to be out in the field doing their respective work. We very quickly worked with the government to say look, you have this example of emergency response that works, and this is what you need because it brings the resources where they're needed, it identifies what the priorities are, and it sets accountable people. Those accountable people have teams working behind them to get things done, and they are on a timeline that is accountable for their delivered work. Can we do that with Ebola? We had discussions with the Gates Foundation about whether we were able to—they had a very

competent and good group that they used in northern Nigeria to help set up electronic systems. It was eHealth Africa, and they not only were good at setting up those electronic reporting systems, but also were quite good at just getting things done in a very rapid way. Could we use them and bring them in to help renovate this space to a space that was more functional, to include electronic data systems quickly and the ability to use field devices to report on contact tracing and other things? It sounds like long processes, but these were all decisions moving to action moving to product within days at a time. That organization happened, the government recognized the value of not just the emergency operations center, but the management, the IMS management, the incident management system, that actually is the hallmark of that responsibility and accountability and tying the resources to the needs. We organized the technical response, and we organized the public relations response and the financing response, within the context of how it was done in the polio EOC. They brought in the deputy incident manager from the polio response eventually, about a week later, to run—

Q: And that's Faisal Shuaib?

Vertefeuille: Yes, that's right, Faisal Shuaib. From CDC's lens, we were looking at what's the best way we can support this, and of course Faisal was very familiar with CDC because of our work in polio. We decided that the best thing to do was to use our team, which had now expanded quite considerably. We probably at this point had eight to twelve people from CDC, but we also had dozens of field epi folks who were used to working with and NSTOP staff, who we were used to working with on a day-to-day

basis. We made sure we placed people from those different groups into the various teams because we knew their training, we knew they were competent, and the government also—they were locals and they were government staff, a mix of all those things, and they had faith and confidence in their ability to get these things done. Then for us, we were placed on the—I ended up advising Faisal that the best place to use the CDC team lead, which at the time was me, was as a special advisor to him as the incident manager for Ebola. The reason for that was that there were so many things that had to be adjusted in the response, because again, it was being developed, and we were learning. Advisement on containment was being changed, advisement on protective equipment was being changed on almost a daily basis at the time. It made sense for CDC, as a technical agency, to be able to advise broadly in the response. That ended up being really important because it allowed us both to do that technical work, but also to engage at a government and political level in a way that was both reaching senior levels of the government, but also being able to identify resources when needed. Dr. Frieden was very involved in this as well. We were having daily calls sometimes that were forty-five minutes, sometimes that were multiple one-hour calls in a day, to help try and contain this in Lagos. Because it's such a big city and such a big population, and so many outlets to other parts of the world through travel, that the stakes were very high. It would have been high anyway, but they were particularly high because of those dynamics.

Q: You said you were kind of sorting people, local people and CDC staff into different teams on the EOC. What are those teams?

Vertefeuille: We had a team that was responsible for decontamination that would go in after somebody had developed symptoms in the community. You would have to go in and make sure that everything was bleached and decontaminated in a way that people could continue to inhabit those spaces. We had a contact tracing team that was going out and making home visits and monitoring temperatures. I think in the response, we did over eighteen thousand home visits for monitoring temperatures in like a six-week period, so very big team there. We had a case management team that was responsible for—the contact tracers would go out and do the monitoring, but the minute they identified somebody that may have symptoms, the case management team would come in, do an assessment, and then transport that person to the Ebola facility where they could be appropriately—within contained space that allowed them to not transmit to others and where they could get good care.

We had also, teams related to the facilities. Because we had to create these wards as we went. The first ward was really not a very pleasant place. It was a rundown, old hospital that was able to function, but just wasn't ideal for the patients and wasn't ideal for the direct care providers. In the process of doing all this, we were also developing a new facility. Part of the day was out, working with construction companies that were going to renovate a facility—I believe it was a TB facility that we found that was not being used at the moment. That was a much better space for isolation and for care for these patients and for the staff. It took a couple of weeks, but we were able to organize that.

Then part of the day was recruiting people. At the beginning, people were so afraid that it was hard to get local physicians and local nurses and providers to come and work on this because there was such an enormous fear. It was really two epidemics: it was the epidemic of disease and the epidemic of fear that swept not just Nigeria, but the whole world related to Ebola. We were putting people in strategic places. The other place that really I think was important for us was the data piece because there were so many different parts of information that were coming in and had to collectively be able to tell us how we were doing with our response capacity, with our monitoring of contacts, how fast we were able to go from identifying somebody who was a contact that might be a suspected Ebola case into a contained facility where we control the environment—not "we" CDC, but the response—controlled the environment and was able to therefore minimize the likelihood of transmission to others. So rather than it taking one or two days, could we in one hour or two hours, move from somebody being suspected of having symptoms to being looked at and moved to a facility? Measuring these metrics. Our teams were doing a lot of work on that. We also had people come in to do infection control measures. Ben [Benjamin J.] Park was really critical to that and came out. We had a team at the airport that was looking at the monitoring and screening at the airports. From the quarantine division, they sent out a couple of folks. Gary [W.] Brunette and a couple others were there, organizing around the ports, both land crossings and airport crossings, and how to manage those symptoms.

I'll give you a couple of anecdotes and things that occurred along the way that were fascinating to me, and also a little bit insightful about the intensity of the response. At a

certain point, I think all of us, we would go, and we had a set time that we were supposed to be there. But you would come to the end of your time not knowing whether the job was done. As I mentioned earlier, there was this immense feeling of relationship to the team, but also making sure that we got this job done. The overlap with Frank and I, he was the team lead and I was coming in to replace him, and even though I was good friends with Frank, there were some things that he keeps very much to himself. He delayed his departure and he didn't say why, but the second time he was getting close to delaying his departure he was a little more focused on the fact that he did in fact need to leave. I said, "Yeah," and he sort of looked at me and he said, "I've got to go, I'm supposed to get married this weekend." [laughter] And he's now married, and actually they are expecting their first child this summer. But there just was a point where he had to go, and so of course I was like, definitely you need to go, and I will take up where you've left off and we'll continue this.

Then a few weeks later—I haven't talked a lot about the epidemiology, but we had a few big surprises. First, some people were hiding cases and were afraid to enter the establishment. They feared the facilities and whether or not going to them meant you were never going to make it out, or you were, and were you going to see your family again. And just fear of potential outcomes of the disease. But then we also had this sort of spur midway through where somebody had hidden their illness and flown to a different city, Port Harcourt, and we had to go out and fly out there and establish an EOC there, a sub-EOC, that reported to the Lagos one. But also establish a facility where they could care for these patients. Because this patient had not wanted to come forward with his

illness, had flown out, had arranged for a doctor to see him in a hotel, and the doctor—it ended up that the doctor ended up both getting Ebola and, unfortunately, dying because of Ebola, but then also passing it on to his wife who had an infant child at home. That was the kind of environment, was this intense fear.

This was getting to be the point where I was due to come back to the US, and we had this offshoot. We had arranged for Nancy Knight to come in, who was—she worked in the CDC office in Nigeria when I was there. We had brought her in to live there, and then she became the CDC country director for Nigeria after I left. She knew Nigeria, and she knew the system, and so she was coming in to replace me as the team lead. I was experiencing the same thing Frank was experiencing, that I had come to the end of my time and I was due to go home. But you were never sure if you had finished the job, and so you would extend and you extend. I wasn't about to get married, but my wife was expecting our first child, and she was eight plus months pregnant, and I was checking in with her every day. We were hitting a point where really, I was going to have to go home. I remember talking with her, I think it was a Thursday or a Friday morning, her time here in Baltimore. She was like, I think it's getting pretty close. I'm due in a week or ten days. You probably need to come, but stay as long as you need to stay. And I said okay, that's it, I'm going to come. It ended up being that in retrospect, we saw the last case the day before I left in Nigeria, but we, of course, did not know that at the time; we were intensively following everyone. I came home thinking I had a couple of weeks before this baby was going to be born, but when we got back, I flew into Atlanta, did some debriefing here, flew up to Baltimore where she was, and we went to see the doctor and

he said, "You're at term, and the growth has slowed a little bit, so we're going to induce you tomorrow." In fact, in short order after coming back, we had this beautiful moment of having our first child, and all of that intensity of the response shifted to that. Then, happily, we discovered a couple of weeks later that we had in fact finished the Ebola work in Nigeria.

Shortly after having the baby, we had the opportunity—because the US was now ramping up, this had hit the main stage globally in terms of being a real global risk. President [Barack H.] Obama came down to CDC to be briefed by Dr. Frieden and others, and they called me in Baltimore, Carmen [S.] Villar gave me a call, and she said, "I know you just had a baby, but would your family consider letting you come down and talk to President Obama about this?" My wife, being in public health herself, said, "You have to do this." But it was funny because we were up there, and she said, "Go down the night before so you can sleep and get a good night's sleep before you brief the president." I said, "Good idea." I flew into our home here. I think the baby was now maybe a week, a week and a half old or two weeks old. I flew into our house here at like ten at night. Went to bed, got up, and we prepped all day at CDC for what we were going to advise the president. It was an afternoon briefing, and we walked him through the basics of what Ebola was and what was going on, the outbreaks, what had worked in Nigeria, how that could potentially be applied to other parts of the response. We finished up, and it was about five to five thirty in the afternoon, and I had to get back to Baltimore to see my wife and baby, but I wasn't going to be in Atlanta for six weeks. One of the great parts of being American is that you're often reminded of that balance between professional and personal responsibilities.

What do you after you brief the president? In my instance, the only instance I've ever had the opportunity to brief a sitting president, what I ended up doing was getting out of here and going and mowing my lawn very quickly and going to the airport. [laughter] That was a day I certainly will remember forever as being both this incredible sense of urgency and commitment and desire to see this response succeed, but also this balance against these immense personal commitments that we all have. And how much as a public health community—it's not just those of us who work, but how much the community, as a whole, gives and cares about this and how much our families give in the course of us doing this work. Those examples that I talked about with Frank and his to-be wife and my wife and our family, you see this repeatedly. This is just something that's incredible about the CDC community. It's not just the staff, it's actually the extended community of the staff and their families and how committed they are to this cause.

Q: Can you tell me a little bit about what it was like engaging with the president?

Vertefeuille: It was very brief. It was a long meeting, but basically we were trying to tell this story of Nigeria in about three minutes. There are many people who engage, who have engaged with different presidents and President Obama, for much longer periods than I have. It was just a little sliver. But I was impressed with the fact that he both was very quick to understand what we were saying and then to translate it into language that almost anybody who had been around would understand. One of the issues that we were talking about was this personal protective equipment and how cumbersome it was and yet how necessary it was to be part of the response. He thought about it, and his comment

was—he commented on several things, but one of the things he said is, he's like, "You keep coming back to this idea that the protective equipment is cumbersome and makes it difficult to do the work." He goes, "Look what the NFL [National Football League] has done with equipment and uniforms. It seems to me that this is something the United States can actually contribute to this response; let's think about how to simplify that, amplify the amounts, and get this out there. Because if it's essential and if it's a problem, it seems like we could fix this." That was his attitude about the whole response, was that if there are bottlenecks, please make them clear because this is important and we've got to get it done. That was the sense I came away from that meeting with, was a sense that even though things were early, that the urgency of the response, the responsibility that the United States had to help solve this in the global community was there, and there was going to be action that followed. And of course we know that there was action that followed in a huge way, from the White House to Congress to everyone that was contributing with the goal of getting this done. I think that's one of—through the course of the rest of my career and my life, that sense of immediate shift from need to action—you don't see it every day, but when you see it happen the way it happened in this response, you know that that's a moment that's special and it makes a difference.

[break]

Vertefeuille: When I think about the response in Nigeria, we often talk about how the polio infrastructure had been critical to making the Ebola response work, and that's absolutely true. The truth is, though, that the story is a little bigger than that. Just from

my own personal engagements in Nigeria, I was able to see various pieces of this story unfold for about a ten-year period. It was smart public health investments that CDC recognized were needed in many places, Nigeria being one of them, and being committed to helping the government in Nigeria develop new capacities in the country over that period. In thinking about my time there and my early work with PEPFAR there and running the CDC office, an investment in knowledgeable people who are able to both have the basic tools of public health, epidemiology, biostatistics, and outbreak response through a Field Epidemiology Training Program. That was an early investment made by the field epi group and by PEPFAR in Nigeria that helped establish this program in about—the first short-courses were done in 2006 and '07, but then the first two-year cohort started in 2008. If you fast forward to the 2014 Ebola response, over a hundred trainees of that program showed up to run various aspects of that response and to contribute thousands of hours to the response and to make it effective. You combine that with lab capacity that was invested in, in the course of the HIV and other programs at that time in the early 2000s, and there were a cadre of very competent, trained laboratorians, as well as facilities and equipment to do molecular testing in the country. That became vital for the Ebola response because you had both equipment and trained people who understood both the infection control issues and had the capacity to do that lab work and bring that to the table. When you combine those investments with an immense surveillance capacity that was done for polio in the country, where you had every district of the country reporting into the system, and the nodes, largely managed by the government with the support of WHO—you had this immense outlet to understand what was going on that could be applied. But then, adding to that, this piece that came out of

the renewed polio response in Nigeria, which was this emergency operations capacity, an incident management system that brings together partners and resources and holds people and groups accountable for getting done individual parts of a response. Everybody at the table understanding what the priorities are, led by the government, administered by the government with its partners, invested in by the government and its partners, and with expectations for not just what the outcome is going to be, but what the timelines were for getting the thousands of things done that needed to happen in that six or eight-week intensive period of the Ebola response. It was really those response capacities. Yes, the immediate part of that was the infrastructure and the skillsets that were coming out of the polio program. But the truth is that there were these longer investments in people and capacities that are core public health elements of response that allowed this to happen the way it did. The government had a capacity to respond and to lead a response, the partners had an outlet through the EOC to contribute to one single response that was happening, and the result was we were able to, with the combined effort, control Ebola at twenty cases in Lagos, which a lot of people would have said at the outset was going to be exceedingly difficult to do. And it was pretty difficult to do.

Q: How did this focus—sometimes I've read criticisms of programs that focus on one specific illness or disease as being too narrow and not—you know, not being applicable toward larger health issues. Like, there needs to be a recognition that building infrastructure is important, that programs like FETP are important. In that ten-year period, where did that recognition—that there needs to be an all-around focus on developing the basic capacities of labs and of people—come from?

Vertefeuille: Well, that's a good question. When I think about that period, one of the very unique things about PEPFAR when it started was that it was aiming to bring a complicated—at the time, even more complicated than it is now—a complicated lifelong treatment program to places that often mostly dealt with acute care. The idea that you were bringing into Africa—many of the original countries were in Africa, I think thirteen of the fifteen original focus countries for PEPFAR, a treatment that required daily administration of drugs for the life of the patient in a system that was not really used to that kind of intense chronic care. It required us to think a lot about what are the things that are specific to HIV, and then what are the underlying systems that are going to allow in that paradigm shift to managing people over the long term. The better we would get at that shift, the less work we would have to do to succeed in our HIV program because you wouldn't have to find somebody four times, you wouldn't have them get an early HIV test and go get in hiding, get sick, because of declined immune function, and get tested again. When I say "in hiding," I don't mean actual hiding, but not coming in. Hidden to the healthcare system. Then having to find them again when they became symptomatic, and then doing the work-up and treating them. If you could monitor them and identify them once and put them on a continuum of care services that eventually resulted in them receiving treatment, you could really extend their life. But to do that, you had to change lab capacities. You had to change the frame by which we collect data in these places. You had to change the mechanisms by which we report back and identify people and report back to them and the services and support services that we provide to them to keep them engaged in their care. I think when we thought through all of that in PEPFAR—and this

was not unique to Nigeria, where I was. This was happening in all of the places that this was occurring. The footprint to do that was bigger than just HIV. From a CDC lens, the way that played out was that we looked at developing a competent lab capacity, developing a capacity for health information and data that included field epidemiology and outbreak response.

Then, the truth is that while this HIV program was being developed, other things were happening, other events were happening in all of these countries that required attention. In Nigeria, while I was there, we had the H5N1 response, first in poultry and then in people, that we had to roll out, that further increased the lab capacities. There was an HIV PEPFAR training lab that had PCR [polymerase chain reaction] capacity, which we were then able to do flu diagnostics during that outbreak. And then build that capacity with flu resources; build that capacity on the vet [veterinary] side as well, so that there was a comparative capacity for dealing with emergent disease from animal populations and human disease. We were able to, later in other responses, build on those components and develop data systems. With the polio response, the pervasive surveillance and community reach combined with the emergency response capacities. I think that—I mean back to your point about how do you think these things through, you really do have to think about it early, but almost—I've done a lot of work in different systems and disease programs in my time overseas with CDC and even back here in polio. You often have a choice early on about how much of your outcome is going to be based on that disease specific need which you are charged to do, and how, with some very simple choices, you can actually build a system around that that is broader and maybe even more resilient than the

individual disease component alone. I see this in my polio work now too, this NSTOP program which we have in Nigeria, which was so central to helping support the Ebola response. They have, through the post-Ebola health protection activities, now engaged on looking at whether the same model of support that we're using for polio would actually be applicable to improving malaria outcomes. It's funded appropriately by that group, but makes use of those capacities because the system and the idea behind that particular program is that it's a pairing of staff in training at the community health level with our investment and the local health team. So building the capacity of the local health team to get better at their polio work by placing someone there for a reasonable period of time, one to two years, and can this actually be used for other health outcomes as well? I think it's just another example. I think we have these choices a lot.

Q: Thank you, there's a lot to dig into there. Actually, one of the questions I was going to ask you was the effect that the Ebola response might have had on polio eradication efforts since you were taking the deputy incident manager from polio and bringing him over to Ebola. Was there some capacity lost there?

Vertefeuille: I've been asked about this a lot of times. In a real emergency response like Ebola was, it's always an issue of weighing what you need in the short-term and what the longer-term impacts are going to be. With certainty, there are a couple of things that came out of the results of Ebola in Nigeria. The first was that everyone, including polio, benefitted from taking Ebola off the table. That is probably the biggest success overall. The population wins, nobody beyond that relatively short period of time had to endure

being infected with Ebola and the outcomes associated with that. The government was able to shift back as a whole, and the health sector was able to shift back as a whole to their normal operations and their normal work, including polio. It just was an all-around win. Beyond that, we knew that at that point, we had a very well-functioning and robust polio response going on. The absence of a couple senior members—and even a bunch of the CDC teams that were typically there doing polio work—for a period of a couple of months was not going to have a huge negative impact in the long-term on polio. It could potentially help change the outcomes related to Ebola in a big way. It ended up, in retrospect, it was the perfect thing to do. At the time, definitely, we were weighing how much could we change focus and not lose the momentum. It turns out that it was July 24th, so right at the same time that Ebola was intensively being pursued, the last polio case seen in Nigeria for a two-year period occurred exactly at that time. It was July 24th, I believe was the exact date.

Q: Twenty fourteen?

Vertefeuille: Twenty fourteen. If you can imagine, that response was ongoing and we had no idea of knowing that at the time, but a year later, Nigeria was removed from the endemic list of polio countries because that case, that last case had occurred at the same time. Now, a year after that, we discovered that in fact, there was a small pocket of polio cases that was missed in northeastern Nigeria, but the Ebola response had nothing to do with that. In fact, that was wholly about the Boko Haram insurgency in Borno State and the fact that they had really put that state under siege and isolated populations that were

larger than we had anticipated, which allowed for sustained transmission of poliovirus. Of course, we discovered that in 2016, as those populations became free, that we identified some cases of polio up there. The rest of Nigeria has not seen any polio, any wild polio, since 2014 in July. If you ask about the long-term effect on polio, there really was none, and the benefit was huge though because the whole system got to reap the benefits of not having continued Ebola, and to go back to its work.

Q: I want to move to Liberia now and talk a little bit about how the experiences that you had in Nigeria, how you were able to bring them into Liberia. What you think your experiences in Nigeria might have added to everything going on.

Vertefeuille: When I think about the Ebola responses, the role I played in Nigeria was a very different role in time and space in terms of where the outbreak was and what was there—

Q: In Liberia?

Vertefeuille: Than in Liberia.

Q: Okay, sure.

Vertefeuille: Really being in at the beginning, and for a very focused, intense, but relatively short response in Nigeria, compared to coming in at the tail end of what had

been a very long and complicated and big response in Liberia. My relative contributions in Liberia are quite small compared to so many others who spent so much time and really were central to that response.

Q: That makes sense. I had forgotten it was 2015 by the time you got—February 2015?

Vertefeuille: Yeah. I just want to make sure that, you know, there were so many people from so many organizations that contributed in countless ways in Liberia—

Q: Sure.

Vertefeuille: —that we recognize how big that response was comparatively. When I was in Liberia, I was on a—this is always a story of the networks that we have and how we come upon finding ourselves in a particular place. I was actually on a one-week TDY to Nigeria to do some polio work in late January of 2015, and got a call from—first from Frank Mahoney who was in Liberia at the time, and said that they were coming down to the last couple of strains, the last couple of transmission lines for Ebola, but they had some organizational needs related to tightening up various aspects of the response. He and I had worked together a lot, and so he thought I would be useful to help make some of those changes. Subsequently, got a call from Brian [D.] Wheeler who was also in Liberia at the time as either the deputy country director or the acting country director of the new CDC office there, and who had worked with me and been my deputy in both the Nigeria office while I was the country director and in Haiti, and so we were longtime

colleagues. They said, can you come give us a hand? Because we could close this down but we need to make some adjustments. I agreed, and I rerouted, and instead of coming back here, rerouted through Paris, down to Liberia, to Monrovia. My bag, my outbreak bag, met me at the airport there or at the hotel. It had been sent from Atlanta, so my clothes and stuff. Jumped into what was a very sophisticated and well organized response. At that point in Liberia, the EOC was functioning well, the government was running their response effectively, some of the people that we see that are recognized as leaders in this global Ebola response were there at the time organizing that response. We wanted to basically ratchet down on a few things. We needed to dig in even further to this complicated epidemiology of this, what has come to be known as the—sorry, I'm blanking—

Q: The St. Paul Bridge—

Vertefeuille: The St. Paul Bridge, yeah, the St. Paul Bridge cluster, which was a very sort of complicated way to end these last lines of transmission because it involved—you could not find a more robust, dramatic script if you were looking at a movie. It was a combination of engagement with the police and different crimes that had taken place and finding victims of crimes that ended up being Ebola positive, and then this group of people who, for all practical purposes, really were sort of—they were just together as a band of people who spent their time and their leisure time, that included drug use, that included sort of criminal elements, under the auspices of this lady who sort of managed that group. Very complicated epidemiology, but also some—it was interesting because

their response capacity was so huge in Liberia, and coming down to these last lines of transmission, you also had a situation where there was so much energy and so many organizations contributing to the response that they were starting to trip over themselves in trying to be central to these last pieces. A lot of what I had to do was just help us focus CDC's work even further on defining the epidemiology and contributing to the government's ability to tighten up the transportation—identification earlier of symptomatic cases in this line, transportation to the facilities in effective ways. And just doing those basic outbreak response activities, that in the noise of the very big response, were happening and probably were happening in a very productive way, but not necessarily on every individual situation being super precise because of the now small nature of what was going on. In order to close now, wrapping up these last lines, in the same way that countless lines have been wrapped up previously in that outbreak, but in order to close it down, doing it in a very effective way. I worked a lot, I worked a lot with the epi group on that, worked a lot with reorganizing how we were placing CDC participants in the response in the field and also in the government reporting structure and the government response structure and making those kinds of adjustments. What was impressive to me in the Liberia response was the very detailed accounting for other activities that was occurring in the EOC. They had been outfitted to deal with this huge response to this outbreak that was occurring in large numbers, and now that they were down to these final clusters, they were able to start thinking through what was the system going to look like in the tail of Ebola. That very small moment of six weeks, five or six—I can't remember how long it was, it was between four and six weeks that I was there—being able to see them starting to think about what reporting and data system would

follow, what community event reporting system would follow, how are they going to reactivate health systems and facilities that had basically stopped seeing patients for various reasons, or at least parts of them had stopped seeing patients because of fear of Ebola.

Related to my polio work, one of the things in the wake of the responses in Liberia and Guinea and Sierra Leone was that polio surveillance had stopped in those countries for a while because nobody really, at the time, nobody could quite figure out what to do with the samples that had been collected for fear that there might be coinfection with Ebola in some of those samples. The inability to transport them to the labs and the reluctance of the labs to receive them. At that moment in time in Liberia, it was interesting to see that inflection point between this huge response capacity and closing down the response.

One of the things that happened in that period with the St. Paul Bridge cluster was that because of the cohesive nature of this group that was a major part of the cluster, and because of the lack of ability to keep track of them in the community, what was proposed and ended up happening was that this big Ebola facility that was now empty because they had been so successful at getting the case counts down was designated to be a place that we would quarantine this group for the period of their monitoring. There was a negotiation that happened with the group to say, if you come in, we'll be able to provide you with food and resources to get you through this period, and you'll agree to stay here and have your temperature monitored a couple of times a day, and we will very quickly get you as good of care as we can get you if you end up having symptoms. It just was an

example of—this was a very practical solution at the time that would not have been available a month or two months before because there still would have been patients in those facilities. But in fact, it was representative of how far the country had come, and now, using a unique strategy of actually quarantining this group in a way that they could keep track of them better, voluntary quarantine of this group, in a way that they could keep track of them better to close down that last line of transmission. And it ended up working. So, a very interesting time there.

Q: Can you give an example of a time when—one thing you mentioned that kind of struck me is, in the beginning of the Liberia response it's clear that there's not enough organizations. It sounds like towards the tail end, there were too many, and they were crowding each other in some ways. Can you give an example of that and a way that that matter was resolved?

Vertefeuille: Sure. If you can imagine going from thousands of infected individuals in 2014 to a handful in 2015, the buildout to deal with and actually, to get to change and bend that epidemiologic curve to a point where you're at that low level of cases and the intensity of that, because this was a rapid Ebola response, was that a big infrastructure was built. You had many treatment facilities, many labs that were put in place in various parts of the country to actually respond to this, thousands of people engaged in the response, and all of a sudden, a handful of places that were still seeing active transmission. You still did have this big and necessary surveillance and monitoring of all community deaths, to check if there was possible Ebola that was missed, and all of that

was happening in the backdrop. But, in these places where they were having cases, you would have a situation where you would have multiple teams show up to try and respond to the cases. Or you would have different groups wanting to contribute to the trainings that were required, all aiming to do well and to use the capacities they'd brought in. But when you're talking about a small handful of facilities and even smaller number of affected individuals, the space became very crowded. What had to and what did happen was that the government used their EOC and their incident management system that they had set up to deal with that. They basically said listen, we have to do this well and we have to continue to respond in a way that we have that got us to this point, which was effectively. To do that, you, CDC, are going to take on these pieces; you, WHO, are going to take on these pieces; you, Médecins Sans Frontières, you're going to take on these pieces, in the same way you have previously, but the scale is much smaller, and we're going to manage this more actively. That, I think, was really important to do and to remind people that that pace and rate that they had been going at, the intensity had to still be there, but the manpower, for the first time probably, was outstripping what was required. It was necessary, but also the scaling back of that was necessary, and that's where they moved to in that period. Of course, it took a lot longer than that to right-size everything. I'm sure, I haven't been following Liberia that closely in the last year, but I'm sure they still continue to wrestle with some of these things in terms of what's the right footprint for their emergency response capacity and what's the right placement for it, because they're complicated issues. But at the time, it was really about making sure that the teams that had worked so well, the interagency teams that had worked so well for

the majority of the response were able to continue to work that well together with a much smaller response need.

Q: I've kept you in here for a pretty long time at this point, and I very much appreciate everything you've dedicated to this. Can you tell me a little bit—did the Ebola response change anything about how you understood the broad field of public health or how you understood CDC or the work of epidemiology?

Vertefeuille: I think that the Nigeria response for Ebola and the Liberia response, I mean, those are the only two times I have been involved in Ebola responses in my career. What surprised me, I had been involved in a lot of outbreak responses, and I had been involved in HIV where it is a life-and-death situation, and getting those services out now can save lives. But when I started doing that, there was not treatment available in a lot of the places where I have worked. What was very surprising to me in the Ebola responses was the intensity of the sense of urgency. It was not just a sense of urgency, it was an absolute intense sense of urgency about everything that was happening. And this heightened awareness that time mattered above so many things, and that what would seem like by all normal standards to be reasonable delays were just not things that were acceptable in that kind of response. I think the intensity of feeling was something I certainly talked with my wife and others on a personal level about at that time. Just remembering how intense it was.

The other thing I would say is that we tend to think about the tragic nature of everything that happened, which is real. But within that, the incredible commitment of communities, of providers, of individuals who are not typically in the health field, to come together and solve a very hard problem because it needs everybody to be contributing. I think that the urgency of the situation, of Ebola, really was for me an incredible reminder of how different groups will come together and contribute. A random example that pops into my head is that Total, which is a petroleum company that works in Nigeria and around the world—early in that response, we came out one day and there were six trucks parked in the lot that they had bought and they had brought. What struck me about that was not the trucks themselves, but they had thought to make sure that they had license plates on them and each one had a gas card in it that was good at any Total filling station in the country for the duration of the response, so that you could actually not just get people where they needed to go, but move disinfecting equipment and supplies around the country, do your contact tracing and everything. That's just one of ten thousand different examples of groups that you wouldn't traditionally expect to show up and help contribute to these health issues turning out to support those local communities that were needing it at the time. That was a great—that was something I will always remember about that response, was that sense of community from the bigger population.

And then lastly, I think that the other thing I would constantly come back to when I think about this response is that amidst all the choices we have to make as we try and provide solutions for public health in places that don't have a lot of infrastructure, when we, as an agency, when we as CDC, invest in local people and local public health providers, that

will pay us dividends in the long term. These local healthcare providers that contributed to the response, these field epi graduates who all showed up to do this response—and some of them actually even turned up in Liberia. I found them in Liberia after that, working on the international response. Those investments that we had made a decade before that were bearing fruit—we have to keep that in mind. Building public health capacity, building laboratory capacity, building emergency management capacity are going to result in better outcomes in perpetuity. I think as we make our decisions, we have to continue to focus on those things.

Q: Thank you so much for being here Dr. John Vertefeuille. I very much appreciate it. This has been brilliant.

Vertefeuille: Well, thanks so much. I appreciate it too.

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